

Analysis of Problems in the Teaching and Learning of Science Process Skills Through Hermeneutic Method in Sjk(T) from North Kinta District

Chelvi Murugayya & Suppiah Nachiappan

^{1,2}Faculty of Human Development, Universiti Pendidikan Sultan Idris, Tanjung Malim, 35900, MALAYSIA

Corresponding Author: chelviknes@yahoo.com

To Cite This Article:

Murugayya, C., & Nachiappan, S. . (2022). Analysis of Problems in The Teaching and Learning of Science Process Skills Through Hermeneutic Method in SJK(T) from North Kinta District. ICCCM Journal of Social Sciences and Humanities, 1(1), 1–7.
<https://doi.org/10.53797/icccmjssh.v1i1.1a.2022>

Abstract: This study was conducted to analysis the problem in teaching and learning of science process skills in SJK(T) through Hermeneutic Method. A qualitative approach was used in this study. This study only focused on 10 National Type (Tamil) Schools from North Kinta District, Perak. This study was conducted on participants consisting of 10 teachers, namely one teacher from each school in North Kinta District. Findings from questionnaires, interview and observations show that respondents still face various problems in the teaching and learning of science process skills. Data were obtained through triangulation results from questionnaires, interviews and observations. Based on the observation, it was found that teachers face difficulties in teaching science process skills such as teachers lack mastery of science process skills and thinking skill, lack of reference materials, time constraints, no diversity in learning and facilitation, students do not understand the concept and requirements of science process skills and thinking skill, students are less skilled in science process skills and students are less interested. The Ministry of Education Malaysia, schools and Science teachers should review and make improvements to the teaching and learning of science process skills.

Keywords: Science Process skill, thinking skill, Hermeneutic

1. Introduction

As a country that is moving towards the status of a developed country, Malaysia needs to create a progressive, scientific society and must have a high power of change, look far ahead and be a contributor to the future Science and Technology civilization. Science has been a very important component of life since time immemorial. It is the core field that contributes the most to human life whether it is exploration in the field of Science and Technology or improving the socio-cultural and economic level of human beings. The Science curriculum in the education system in Malaysia emphasizes on the integration of knowledge acquisition skills and mastery of scientific skills as well as thinking skills. These skills can be nurtured among students through creative and innovative teaching and learning methods to produce meaningful learning (Nor Amalina & Zanaton, 2018).

Science education in Malaysia involves the development of human beings who can master the knowledge of Science and technological skills (Curriculum Development Division [BPK], 2013). The goal of FPS and the intention of the Malaysian Education Development Plan [PPPM, 2013-2025] (PPPM, 2013) is to produce science-knowledgeable teaching staff. Science knowledge has the ability to link the Science teaching system with an emphasis on thinking, psychomotor and effective skills (PPPM, 2013). Therefore, the formation of the National Type (Tamil) Schools curriculum, especially Science subjects is constantly renewed to be in line with the development of students' potential at this time.

In order to make these goals realistic, teachers should play their roles effectively in teaching Science subject. Various methods can be used by teachers to nurture and guide students to acquire knowledge, master scientific skills and practice noble values in learning Science to become more critical, analytical and responsible. The approaches presented are experimental, discussion, simulation and project. Experimentation refers to the method of testing a hypothesis through investigation. This requires students to learn process skills and manipulative skills. Student discussion includes the process of questioning and submitting opinions based on authentic reviews and having an open mind to accept the

opinions of others. With effective teaching and learning, students' attitudes and mastery of the basic concepts of Science can be improved effectively thereby achieving the desired excellence (Aziz & Lin, 2011).

However, teachers do not use various teaching methods to attract interest in the subject. There are a handful of teachers who do not use teaching aids when teaching in the classroom. With this, students feel less interested in Science subjects and weak in mastering science process skills and thinking skills. There are also teachers who are not Science option but teach Science in primary schools due to lack of teachers. They had to teach the subject of Science even though there was no knowledge in the subject. This affects students' mastery of Science skills.

To ensure that science education in National Type (Tamil) Schools achieves its intended goals, it is essential to understand the contextual and systemic challenges faced by science teachers. Among the common challenges are limitations in infrastructure, insufficient access to updated teaching materials, and large class sizes, which reduce opportunities for student-centered learning. According to (Superni, 2018), many Tamil schools face resource constraints that make it difficult to implement interactive and inquiry-based science instruction. As a result, science education tends to remain textbook-centered and teacher-dominated, limiting students' opportunities to explore, question, and experiment core components of scientific literacy.

In addition, the language of instruction also poses a significant challenge. Although the curriculum is designed in the national language, students in Tamil schools may face difficulties in understanding science concepts due to limited proficiency in Bahasa Malaysia, particularly when the language used in science textbooks is too technical. This linguistic barrier affects not only students but also teachers, especially those who are not science-trained and struggle with both subject content and pedagogical delivery. Language comprehension plays a critical role in constructing scientific knowledge. If not addressed, this can lead to low student motivation and poor performance in science-related subjects, ultimately widening the educational gap among ethnic groups in Malaysia.

Therefore, the researcher thinks that it is important to know the problems of teachers in teaching and learning of Science subjects in National Type (Tamil) Schools as well as ways to overcome the problems it becomes imperative for the Ministry of Education and related stakeholders to provide targeted support for science teachers in SJKT. This includes continuous professional development programs focused on pedagogical content knowledge, training in multilingual instruction strategies, and the development of culturally responsive science teaching resources. Moreover, initiatives that promote community engagement and parental involvement in science education can further support learning beyond the classroom. By addressing these challenges holistically, science education in Tamil schools can become a more inclusive, effective, and empowering process for all students, contributing to Malaysia's broader vision of becoming a scientifically advanced nation.

2. Research Objectives

This research is carried out in order to identify the problem of teachers in the teaching and learning of Science subjects in National Type (Tamil) Schools as well as ways to overcome them. The specific objectives of this research are as follow:

- i. Identify the problems faced by teachers in teaching and learning science process skills in National Type (Tamil) School from North Kinta District.
- ii. Describe the methods used by teachers to solve problems in teaching and learning science process skills in National Type (Tamil) Schools from North Kinta District.

3. Research Questions

There are two research questions in this research which are:

- i. What are the problems faced by teachers in teaching and learning science process skills in National Type (Tamil) Schools from North Kinta District?
- ii. What are the methods used by teachers to solve problems in teaching and learning science process skills in National Type (Tamil) Schools from North Kinta District?

4. Literature Review

The application of science process skills in teaching and learning can be considered a challenge to primary school Science teachers. The implementation of the science curriculum will be successful when there are trained science teachers to plan science teaching and learning activities by applying science process skills. Priority should be given to the mastery of science process skills compared to the mastery of facts and principles of science alone. This is because, the science process skills learned will help and relate to the facts of science principles indirectly.

Mastery of science process skills is considered important as it is accepted as a way to improve the quality of science education in the country. Students taking Science-related electives should deepen these skills as they are considered to be venturing into science and technology-based fields that indeed require mastery of scientific skills. However, the level of mastery of these skills is still at a moderate level. The low level of mastery of science process skills of teachers causes various problems. Teachers' negligence in mastering science process skills also causes difficulties in applying these scientific skills among students. In addition, obstacles such as lack of appropriate teaching aids and less appropriate application methods in pdp can also contribute to the problem of low KPS mastery or not being at the expected level.

A study entitled the relationship between attitudes towards the subject of Science with the mastery of science concepts was conducted involving a total of 140 form two students in Skudai, Johor (Aziz & Lin, 2011). The findings of the study showed that the attitude towards the subject of Science had a significant but weak relationship with the mastery of the basic concepts of Science of form two students. According to the researchers for this study, science teacher attitudes, classroom atmosphere and classroom control play an important role in the mastery of science skills.

Suziana (2012) conducted a survey study to identify the level of mastery of science process skills, teachers' attitudes about teaching scientific skills, barriers in the implementation of scientific skills teaching and the level of implementation of scientific skills teaching among Agricultural Science teachers in National Secondary Schools and Technical Secondary Schools throughout Malaysia. The study population consisted of 469 teachers who teach Agricultural Science subjects throughout Malaysia. The respondents of the study consisted of 211 Agricultural Science teachers in Malaysia. The results of the study showed that only 68.2% of Agricultural Science teachers mastered science process skills, so it proves that teachers still face problems in teaching and learning science process skills in schools.

Fitri (2014) has conducted a study to see the level of mastery. Science process skills among Year 5 students in Kudat District, Sabah. The results of the study found that there is a significant relationship between the mastery of science process skills with the achievement of Science subjects among Year 5 students. Based on the opinions of students and teachers, there are many problems encountered in the mastery of science process skills. According to him, the mastery of science process skills among teachers and students in the study school is at a moderate level.

As a whole, it can be concluded that there are still problems in the mastery of science process skills among students and teachers in our country. Various reasons are at the root of the problem of mastering science process skills. Thus, this study aims to identify the problems of teachers in the teaching and learning of Science subjects in Tamil Primary Type Schools as well as ways to overcome them.

5. Research Methodology

5.1 Research design

In this study, the study design is based on qualitative method that lead to text analysis and interpretation using Hermeneutic method. Hermeneutic method is also referred to as an interpretive method and the process of data analysis is through the process of interpretation.

Accordingly, the data collection in this study is based on a qualitative method approach. This method helps to obtain information based on triangulation data, namely questionnaires, interviews, observations of teaching sessions. Questionnaire and interview instruments were used to obtain data findings from teachers on problems in the teaching and learning of science process skills.

All instruments are analyzed through the Hermeneutic method which is the art of thinking during the process of interpretation by understanding the subject studied through a text that reveals something implicit and explicit in the study (Loganathan, 1995). All interpreted research instruments are text or information used to generate the research text and the interpretation process is used to refine the text and categorize the text according to the research questions.

5.2 Research Sample

This study was conducted in 10 National Type (Tamil) Schools in North Kinta district, Perak. A total of 10 teachers, namely a Science option teacher who teaches Science subjects from each identified school was selected as a sample in this study. The selection of National Type (Tamil) Schools is based on the teaching staff which consists of various races, genders, ages, academic levels and experience teaching Science subjects. The teachers involved are teachers who teach Year four to six Science subjects.

5.3 Research Instrument

The purpose of this survey was to survey the problems faced by Science teachers in the teaching and learning of science process skills in National Type (Tamil) Schools in North Kinta District. There are 3 types of instruments used in this study, namely questionnaires, interviews and observation of teaching and learning time.

6. Findings and Discussion

6.1 Respondents' Demographic Analysis

Based on the demographic analysis of the gender of the respondents, 80% are female teachers and 20% are male teachers. Next, it was found that 100% of the respondents are Indian. The aspect of academic level shows that 70 % of the respondents have a Master's degree while another 30 % of the respondents have a Bachelor's degree. Based on the aspect of specialization, it was found that 100% of the respondents had the Science option. On the other hand, the experience of teaching Science subjects from 1-10 years is 10%, 11-20 years is 50% and experience over 20 years is 40%.

6.2 Analysis of Research Questions

6.2.1 Research Question 1: What are the problems faced by teachers in teaching and learning science process skills in National Type (Tamil) Schools from North Kinta District?

Findings of the interpretation of the original text showing the problems faced by teachers in the teaching and learning of Science Process Skills (KPS) in National Type (Tamil) Schools in North Kinta District. Hermeneutic analysis performed showed that the main problem faced by teachers was the confusion with the intent of the main question in KPS is making inferences. This problem shows the highest frequency of 6 respondents. This is because students lack continuous training in dealing with various types of questions and there are no special guidelines that can be used as reference material. The results of the interviews from 5 respondents support the findings of the questionnaire data from the interpretation are as follows.

'I have difficulty teaching inference because students need to understand the intent of the question and think out of the box as well as throw ideas critically' (R1)

'Making inferences due to different levels of understanding of students. In this case students need to understand the topic as a whole before answering the questions given' (R3)

'Making inferences. To answer this question students need to be proficient in remembering all the facts of Science and must be proficient in relating the requirements of the question with the facts of Science' (R6)

'The most difficult is for KPS to make inferences because most students do not make additional references or self-reading at home to understand the concept of Science well' (R7)

'Making inferences is a KPS that is difficult for students to understand because students rarely practice at home and the requirements of the question are difficult to understand' (R10).

In addition, it was found that the problem of lack of laboratories in schools and insufficient science equipment also affects the teaching and learning of Science KPS. Both of these problems showed the second highest frequency with 4 respondents. Various activities and experiments could not be carried out because there was not enough equipment and no conducive place to teach certain KPS students. Time constraints are also the cause of the imperfection of a teaching and learning session with the results of 3 respondents. Where time allocation for Science subjects is not sufficient to teach science facts and experiments. The results of the interviews from 4 respondents support the findings of the questionnaire data from interpretation through Hermeneutic method.

'While conducting the experiments, the teachers did not have time to finish the experiments due to time constraints, less conducive laboratory rooms where lack of facilities and inadequate equipment. This caused the teacher not to have time to finish the experiment as scheduled and the students did not understand the lesson that day. I prepared science materials or equipment before the day of the experiment but I could not conduct the experiment because equipment such as microscopes, petri dishes, etc. are not in the laboratory room' (R1)

'Difficult KPS cannot be explained properly and accurately without appropriate teaching aids. In addition, there are KPS that need a long time to be explained but the time allocated is not enough' (R3)

'Pupils are unable to experiment on their own to understand it in detail. They don't get a chance to feel how to do an experiment' (R6)

'Often time constraints make it impossible to repeat the same topic a second time for effective learning' (R10)

The next problem is the problem of lack of understanding of the intent of the question, confusion with the use of standard measures, lack of understanding of the concept of KPS, lack of skill, and confusion with answering techniques. These problems each recorded a frequency of 3 respondents. These problems exist because they do not understand the concept of KPS in detail and no suitable reference books are provided. The exposure given to the students is inadequate and does not help in the learning of certain KPS. The results of the observation findings from 5 respondents support the findings of the questionnaire data from the interpretation.

'This teacher does not emphasize or tell students about the KPS linked in the title. But teachers relate in activities. Ideally, teachers need to explain the KPS related to the topic first so that KPS becomes a habit for students' (R1)

'Teachers face difficulties in teaching how to interpret data especially to weaker pupils. Teachers cannot give a complete explanation according to students 'level of mastery' (R3)

'Teachers find it difficult to explain and differentiate a feature found in KPS orally, especially to weaker students' (R6)

'There is no two-way communication. Pupils do not answer when the teacher asks a question' (R9)

'Teachers do not focus on KPS explanations taught in class. Teachers are not skilled in explaining the concept of KPS taught' (R10)

In addition, there are some problems such as incorrect use of senses, confusion in answering questions, inability to make classifications, lack of interest, giving irrelevant answers, not knowing how to make connections, teachers are less efficient in teaching weak students, lack of understanding of needs questions, lack of reference books as well as not being able to define scientific terms. These problems showed a frequency of 2 respondents. Next, problems such as only following what is taught by the teacher, lack of ideas, use of inaccurate terms, lack of knowledge, need of teacher guidance, low understanding, lack of skill, easy forgetfulness, difficulty in answering high level questions, lack of focus, errors in measurement readings, lack of training, giving extreme answers, low level of mastery, low imagination, non-diversified activities, very wide scope, lack of practical science activities, no laboratory assistants, no conducive atmosphere and lack of exposure to experiments showed the lowest frequency of one respondent only.

Besides that, researchers found that learning problems among students also exist because the exposure given to students is insufficient and does not help in the learning of certain KPS. Most students have a poor perception and acceptance of the importance of KPS in learning Science. Science learning activities are admittedly not fully accepted as important in increasing students' interest in science, strengthening students' understanding of science concepts and can improve students' scientific skills. Studies that state that students' mastery of science process skills are very low due to inadequate exposure to KPS. It was found that the implementation of Science learning activities was implemented at a moderate level. Respondents are of the view that the main factors that influence the effectiveness of the application of science process skills among students are the factors of teacher knowledge and skills, teacher teaching strategies and student discipline during PdPc while the secondary factor is the factor of student achievement in Science subjects. Factors of teachers' teaching strategies and lack of teaching materials are obstacles to the effective application of KPS (Umi Rohafizah, 2008). Among the factors identified are teachers lacking exposure and training on the concept of KPS, teachers lack skills in performing assessment and management activities related to KPS, elements to be taught and assessed are too many (Ros Ayu, 2007). Besides that, scoring scheme that is too rubric-based, difficulty in obtaining reference sources for teachers and students who are negative, passive and lack cooperation are also the problems that has been identified.

The findings of the study also found that most students could not answer the questions or exercises given by the teacher and had difficulty remembering the formulas and terms of Science due to the failure of respondents to understand what was taught by the teacher. The implementation of the new curriculum has resulted in many Science terms that students need to know. Before students master a concept, students need to understand each term used (Philips, 2003). This has caused respondents to often face problems learning Science and challenged them to master the KPS taught fully. In relation to that, the findings of the study found that the students could not answer the test questions or the Science examination well because the students could not understand the requirements of the questions in detail and thoroughly.

6.2.2 Research Question 2: What are the methods used by teachers to solve problems in teaching and learning science process skills in National Type (Tamil) Schools from North Kinta District?

Based on the analysis, it is found that teachers diversify their teaching by using various methods in addressing the problem of teaching and learning science process skills. Teachers are more likely to use the method of multiplication training to produce an effective teaching and learning session. This method showed the highest frequency of three respondents. In addition to these methods, teachers also use methods such as the use of relevant examples, ongoing guidance, introduction to communication media, thinking outside the box, a variety of teaching aids, effective use of modules and screening of experimental videos. These methods showed a frequency of two respondents. This clearly shows that teachers take various initiatives to provide effective input to students and strive to produce highly effective PdPc.

Referring to the results of the interviews, it was found that all respondents work hard to produce effective teaching and learning. They use a variety of methods to provide exposure and detailed understanding of the KPS-KPS found in the Science syllabus. The methods used by the respondents can increase students' understanding of the KPS learned and it succeeds in attracting students' interest. Buntat and Ahmad (2011) also stated that teachers do not have to be tied to one method only in implementing teaching and learning, instead always think creatively outside the box of ordinary thinking to find and try to produce new methods and approaches that are more effective. Based on a study conducted by Craft, Bob, & Leibling, (2001), teachers who are creative and good at educating will make it easier for students to understand a concept or a skill, while teachers who are less creative in educating or teaching will make it difficult for students to

understand a concept or a skill, in fact it will cause the teacher's teaching will be boring, students will not focus on their lessons or students may not want to enter the classroom.

Conclusions from the analysis of the methods used by teachers in teaching and learning KPS show that teachers take various initiatives to create an effective Science learning environment. They took this initiative with the notion that the methods used in PdPc Science would be a cure for the problems encountered in PdPc Science as discussed in study question 1 and hoped that it would help improve the overall achievement of KPS Science. Although various methods are used, the examination results are still at a satisfactory level. To further improve the performance of Science, teachers should be exposed to a complete guide that can help teachers to expand their skills as well as strive to achieve excellent results.

7. Conclusion

The problems faced by teachers in teaching and learning science process skills in National Type (Tamil) Schools from North Kinta District have been discussed in this study. Findings from questionnaires, interviews and observations indicate that respondents face various problems in teaching and learning science process skills. The level of mastery of KPS must be improved. Therefore, this is the responsibility of all parties involved in the development of Science, especially educators who teach Science to ensure that KPS is used properly so that this problem does not persist until the upper secondary level.

Acknowledgement

The authors would like to thank the fellow authors and organizations whose intellectual properties were utilized for this study.

Conflict of Interest

The authors declare no conflicts of interest.

References

- Aziz Nordin & Lin Hui Ling. (2011). Hubungan Sikap Terhadap Mata Pelajaran Sains Dengan Penguasaan Konsep Asas Sains Pelajar Tingkatan dua. *Journal of Science & Mathematics Educational*,2.
- Bahagian Pembangunan Kurikulum, (2018). Kurikulum Standard Sekolah Rendah. Sukatan Pelajaran Sains Tahun Empat. Kuala Lumpur: Kementerian Pendidikan Malaysia.
- Bahagian Pembangunan Kurikulum. (2013). Kurikulum Standard Sekolah Rendah. Sukatan Pelajaran Sains Tahun Satu. Kuala Lumpur: Kementerian Pendidikan Malaysia.
- Buntat, Y. & Ahamad, L. (2011). Inovasi Pengajaran Dan Pembelajaran Dalam Kalangan Guru-Guru Teknikal Di Sekolah Menengah Teknik Dari Perspektif Guru. *Fakulti Pendidikan, Universiti Teknologi Malaysia*, 1–8.
- Craft, A., Bob, J. & Leibling, M. (2001). *Creativity in Education*. First Published. London: Continuum Studies in Lifelong Learning.
- Fatin Aliah Phang (2011). Kemahiran Proses Sains Dalam Kalangan Mahasiswa Pendidikan Sains di UTM. *Journal of Science and Mathematics Educational*, Vol.3,123-133.
- Fitri Shahwaliah. (2014). Penguasaan Kemahiran Proses Sains dan Pencapaian Mata pelajaran Sains Dalam Kalangan Murid Tahun Lima sekolah Kebangsaan Di Kudat. *Jurnal Penyelidikan Kent*, 13.
- Loganathan, K. (1995). Pedagogic Hermeneutik and the unification of positive Hermeneutic Sciences. Paper presented at the "The International Seminar of Asian Bishops" Association, New Delhi dan di Pusat Pengajian Ilmu Pendidikan, Universiti Sains Malaysia.
- Nor Amalina & Zanaton Iksan. (2018). Pengetahuan,Kemahiran Pelaksanaan Dan sikap Guru Terhadap pembelajaran Berasaskan masalah (PBM) Dalam Mata Pelajaran Sains, Seminar Antarabangsa Isu-isu Pendidikan.
- Norazlin Mohd Rusdin & Siti Rahaimah Ali. (2019). *Amalan dan Cabaran Pelaksanaan Pembelajaran Abad ke-21*. e-ISBN 979-967-2231-26-4.
- Philips, J. A. (2003). *Pengajaran Kemahiran Berfikir: Teori dan Amalan*. Utusan Publications & Distributors: Kuala Lumpur.

Ros Ayu Abdullah. (2007). Penilaian Kerja Amali (PeKA) Sebagai Satu Alternatif. Tanjong Malim: Universiti Pendidikan Sultan Idris. (Tesis arjana yang tidak Diterbitkan).

Superni, S. (2018). Pengaruh model siklus belajar 5E (Engagement, Exploration, Explanation, Elaboration, Evaluation) terhadap kemampuan berpikir kritis dan penguasaan konsep IPA. *International Journal of Elementary Education*, 2(2), 115-122. <https://doi.org/10.23887/ijee.v2i2.14413>

Suziana. (2012). Tahap penguasaan proses sains dan sikap guru serta halangan dalam pengajaran kemahiran saintifik bagi mata pelajaran sains pertanian. Serdang: Universiti Putra Malaysia. (Tesis Sarjana yang tidak diterbitkan)

Umi Rohafizah Zainudin. (2008). Keberkesanan Pelaksanaan Amali Terhadap Pemahaman Konsep Asid dan Bes di Kalangan Pelajar Kimia Tingkatan 4. Tesis Sarjana, UPSI.